Monitoring Tissue Oxygen Saturation in Microgravity

Problem Statement

- Technology is needed for monitoring tissue oxygen saturation (StO_2) in space
- This is because evidence now suggests that oxygen levels may be lowered in the body's tissues during spaceflight and may accelerate bone decay
- Commercial medical monitoring technology that has recently been developed could be used to measure StO_2 in space, following evaluation and maturation in microgravity
- Users: NASA and other space agencies; commercial spaceflight providers and participants; patients on Earth

Technology Development Team

- **PI**: Dr Thomas Smith
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- **Funding**: NASA Flight Opportunities Program
- The payload is a proprietary product of Hutchinson Technology Inc., Minnesota

Proposed Flight Experiment

Experiment Readiness:

- Experiment is flight ready

Test Vehicle:

- Parabolic Aircraft

Test Environment:

- Microgravity (0 g)

Test Apparatus Description:

- InSpectra™ StO_2 Spot Check (model 300)
- StO_2 is measured by near-infrared spectroscopy and is displayed continuously in real time
- Portable, handheld, battery-powered handset is connected by a 1-meter cable to the interface clip, which is applied to the test subject.

Technology Maturation

- Current TRL 4: *Established technology but payload has not been flight-tested*
- Expected increment of two TRL levels with this flight campaign – TRL 5 and 6: *Validation and demonstration in the relevant environment (microgravity)*
- This would be achieved by successful StO_2 measurements in microgravity during a 2014 flight campaign

Objectives of Proposed Experiment

1. Assess successful basic operation of the technology with respect to data capture in microgravity conditions
2. Assess ease of use and identify possible risks in the flight environment
3. Make the first measurements of StO_2 in microgravity, providing unique clinical data to guide further maturation for use in space (this data may also provide benefits for this technology's use in patients)

Technology Area addressed by this technology: TA06 – Human Health, Life Support and Habitation Systems